Notice of Allowability	Application No.	Applicant(s)	
	10/626,851	OYSTOL ET AL.	
	Examiner	Art Unit	
	Douglas N Washburn	2863	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address--

All claims being allowable, PROSECUTION ON THE MERITS IS (OR REMAINS) CLOSED in this application. If not included herewith (or previously mailed), a Notice of Allowance (PTOL-85) or other appropriate communication will be mailed in due course. **THIS NOTICE OF ALLOWABILITY IS NOT A GRANT OF PATENT RIGHTS.** This application is subject to withdrawal from issue at the initiative of the Office or upon petition by the applicant. See 37 CFR 1.313 and MPEP 1308.

1. ☒ This communication is responsive to *document filed 6 February 2004*.

2. ☒ The allowed claim(s) is/are *1-25*.

3. ☐ The drawings filed on _____ are accepted by the Examiner.

4. ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
   a) ☐ All b) ☐ Some* c) ☐ None of the:
      1. ☐ Certified copies of the priority documents have been received.
      2. ☐ Certified copies of the priority documents have been received in Application No. _____ .
      3. ☐ Copies of the certified copies of the priority documents have been received in this national stage application from the International Bureau (PCT Rule 17.2(a)).

   * Certified copies not received: _____.

Applicant has THREE MONTHS FROM THE "MAILING DATE" of this communication to file a reply complying with the requirements noted below. Failure to timely comply will result in ABANDONMENT of this application.
THIS THREE-MONTH PERIOD IS NOT EXTENDABLE.

5. ☐ A SUBSTITUTE OATH OR DECLARATION must be submitted. Note the attached EXAMINER'S AMENDMENT or NOTICE OF INFORMAL PATENT APPLICATION (PTO-152) which gives reason(s) why the oath or declaration is deficient.

6. ☒ CORRECTED DRAWINGS (as "replacement sheets") must be submitted.
   (a) ☒ including changes required by the Notice of Draftsperson's Patent Drawing Review (PTO-948) attached
      1) ☒ hereto or 2) ☐ to Paper No./Mail Date _____.
   (b) ☐ including changes required by the attached Examiner's Amendment / Comment or in the Office action of Paper No./Mail Date _____.

   Identifying indicia such as the application number (see 37 CFR 1.84(c)) should be written on the drawings in the front (not the back) of each sheet. Replacement sheet(s) should be labeled as such in the header according to 37 CFR 1.121(d).

7. ☐ DEPOSIT OF and/or INFORMATION about the deposit of BIOLOGICAL MATERIAL must be submitted. Note the attached Examiner's comment regarding REQUIREMENT FOR THE DEPOSIT OF BIOLOGICAL MATERIAL.

Attachment(s)

1. ☒ Notice of References Cited (PTO-892)
2. ☒ Notice of Draftperson's Patent Drawing Review (PTO-948)
3. ☒ Information Disclosure Statements (PTO-1449 or PTO/SB/08), Paper No./Mail Date 29 October 2003
4. ☐ Examiner's Comment Regarding Requirement for Deposit of Biological Material
5. ☐ Notice of Informal Patent Application (PTO-152)
6. ☐ Interview Summary (PTO-413), Paper No./Mail Date _____ .
7. ☐ Examiner's Amendment/Comment
8. ☒ Examiner's Statement of Reasons for Allowance
9. ☐ Other _____.

Prior Art Cited

1 Sasaki (JP 2002-175120) teaches a drive control device for an actuator, wherein positioning error of the actuator is measured for one rotation of the output shaft of a wave reduction gear based on absolute position of a motor rotating shaft. The measured error data are averaged and the error correction data is added to the detected rotating position information to create rotating position correction information. The rotating position correction information is then used as position feedback information for controlling the positioning of an actuator output shaft. Sasaki is silent regarding determining a geometric error vector from the shaft-end position data and using the geometric error vector, determining the pointing error of an object.

Kanayama (JP 2002-244740) teaches an actuator drive controller storing error compensation data indicating an error compensation value for each rotation angle position of a motor rotary shaft. Obtaining positioning error of the actuator by measuring one rotation of an output shaft based on an absolute position of the output shaft of the wave gear reduction gear and averaging the measured error data, the error compensation data is obtained. When drive control is performed, a rotation position of the motor rotary shaft is detected, an error compensation value is added to the detected rotation position information to prepare rotation position compensation information and use this information as position feedback information for positioning-controlling the actuator output shaft. Kanayama is silent regarding determining a geometric error vector from the shaft-end position data and using the geometric error vector, determining the pointing error of an object.

Kubo et al. (US 3,681,583) teaches controlling the attitude of a spinning satellite by introducing current through an attitude control coil wound around the spin axis so as to allow the spin axis to be oriented to the desired direction on the basis of the interaction between coil current and the geomagnetic field. The direction and magnitude of current introduced into the attitude control coil is determined by composing a switching function using a vector operator from the vector B of earth's magnetic field measured by a magnetometer, the vector K of the direction of the spin axis of the satellite supplied by an attitude sensor and an error vector E corresponding to the difference between the spin axis and desired direction as supplied by an error detector and then defining the notation and magnitude of the resultant function S. Kubo is silent regarding determining a geometric error vector from the shaft-end position data and using the geometric error vector, determining the pointing error of an object.

Phillips (US 3,830,447) teaches a dual-spin spacecraft having a de-spun platform is arranged to vary or modulate torque on a stabilizing member, such as a momentum wheel, by a motor whose speed is varied or modulated in accordance with a signal representing nutation motion (pointing error) to damp or attenutate the nutation motion substantially to zero very rapidly. A phase shifting network is provided to shift the phase of the cyclic sensor output signal by a predetermined angle such that optimum damping of the nutation motion is achieved. Phillips is silent regarding determining a geometric error vector from the shaft-end position data and using the geometric error vector, determining the pointing error of an object.

Stelzer (US 4,894,788) teaches a method for positioning a tool of a multi-joint robot in which an incorrect positioning of the tool resulting from non-ideal geometrical relationships is compensated. The method is described by determining a preliminary desired angular position for each of the joints for a desired position in space of the tool based upon the reference distances and joint axis directions required to position the tool in the desired position. Determining positioning error of the tool due to the differences between the reference distances and the desired directions and the actual spacings and actual directions of the joints, Transforming determined positioning error into corresponding angular correction values for the preliminary desired angular positions of the joints. Calculating the error-corrected angular position for each of the joints by addition of the angular correction values to the preliminary desired angular positions. Moving the tool to the desired position by rotating the joints in accordance with the error-corrected angular position calculated. Stelzer is silent regarding determining a geometric error vector from shaft-end position data and using the geometric error vector, determining the pointing error of an object.

Agrawal et al. (US 4,911,385) teaches a system and method for attitude control in a geosynchronous satellite. Compensation for pointing errors is effected using an inertially fixed momentum vector coupled to the satellite through a gimbal system. Gimbal torquers torque the satellite about the inertially fixed momentum vector in a time-varying manner to effect correction of the roll and yaw pointing errors. Agrawal is silent regarding determining a geometric error vector from shaft-end position data.

Allowable Subject Matter

2 The following is an examiner's statement of reasons for allowance:

Claim 1 recites, in part, "determining a geometric error vector for each end of the shaft from shaft-end position data; and using the geometric error vector, determining the pointing error of an object". This feature in combination with the remaining claimed structure avoids the prior art of record.

Claim 7 recites, in part, "determining a geometric error vector for each end of the shaft and using the geometric error vector, determining the pointing error of an object". This feature in combination with the remaining claimed structure avoids the prior art of record.

Claim 19 recites, in part, "determining a geometric error vector from the position data for each end of the shaft; using the geometric error vector, determining the pointing error of an object". This feature in combination with the remaining claimed structure avoids the prior art of record.

Claim 22 recites, in part, "determining a geometric error vector for each end of the shaft from the position data; and using the geometric error vector, determining the pointing error of an object". This feature in combination with the remaining claimed structure avoids the prior art of record.

Claim 24 recites, in part, "computing the pointing device error

$$MOA\_ERROR = \begin{bmatrix} \Delta_{azy}.\cos(el+\pi/4) - \Delta_{el}.\sin az \\ -\Delta_{azy}.\cos(el+\pi/4) + \Delta_{el}.\cos az \\ \sin(el+\pi/4)(-\Delta_{azy}.\cos az + \Delta_{azx}.\sin az) \end{bmatrix}$$

where Δ_{azy} denotes a y-axis component of the first axis position error, Δ_{az}; Δ_{azx} denotes a x-axis component of the first axis position error, Δ_{az}; *el* denotes an angle in the second axis, and *az* denotes an angle in the first axis". This feature in combination with the remaining claimed structure avoids the prior art of record.

Claim 25 recites, in part, "determining a geometric error vector for each end of the shaft from position data; using the geometric error vector, determining the pointing error of an
object". This feature in combination with the remaining claimed structure avoids the prior art of record.

It is these limitations, which are not found, taught or suggested in the prior art of record, and are recited in the claimed combination that makes these claims allowable over the prior art.

Any comments considered necessary by applicant must be submitted no later than the payment of the issue fee and, to avoid processing delays, should preferably accompany the issue fee. Such submissions should be clearly labeled "Comments on Statement of Reasons for Allowance."

Conclusion

3 Any inquiry concerning this communication or earlier communications from the examiner should be directed to Douglas N Washburn whose telephone number is (571) 272-2284. The examiner can normally be reached on Monday through Thursday 6:30 AM - 4:30 PM.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, John E Barlow can be reached on (571) 272-2269. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR.

Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

DNW

MICHAEL NGHIEM
PRIMARY EXAMINER
11/10/04